California Fish and Game Commission
Wildlife Resource Committee
September 17, 2020

Steven Childs

Context matters

- Studies examined by Treves were based in North American and European livestock farms (predominantly rural areas)
  - Only one study (Conner et al. 1998) was conducted in California.

    Located in rural Mendocino County (Hopland Research and Extension Center).
- Examined as interventions to prevent carnivore predation on livestock, not human wildlife conflict related.
- Mentions coyotes “in response to moderate rates of human induced mortality, coyotes frequently showed compensatory reproduction, resulting in higher population growth rates and population densities during subsequent years (Knowlton et al. 1999).
  - Treves failed to mention the same study quoted said (Knowlton et al. 1999): “Mean litter size in an unexploited coyote population in Yellowstone National Park increased over 3 years in response to increased availability of ungulate carcasses during winter (Gese et al. 1996a, 1996b).

Most of us (including most pets) are not cattle and we live in densely populated areas that present different challenges requiring different management techniques. Treves and Strauss did not discuss the effectiveness of tools applied to rural agricultural settings (fladry, foxlights, livestock guardian dogs) as they would be applied to urban environments.

Urban vs. Rural

Tolerance for coyotes: higher
No Hunting
No Trapping-150 yard rule FGC 465.5
Very little Lethal Management
Exclusion difficult (municipal code limits)
More aggressive behavior towards pets and people
Higher food availability
home range average: 7.3 km2

Tolerance for coyotes: lower
Hunting more common
Trapping/Snaring more common
More lethal management
Exclusion less restrictive
Less aggressive behavior towards pets and people (risk aversive)
Lower food availability
home ranges average: 17.5 km2

Urban coyote behavior

A growing body of evidence from studies suggests urban coyotes exhibit bolder behavior than their rural counterparts and that bold behavior increases over time.

“We found that parents were riskier (i.e., foraged more frequently) with their second versus first litters, supporting our prediction that parents become increasingly habituated over time.” (Schell et al. 2018)

“Our results suggest that parental habituation may be an ecological cue for offspring to reduce their fear response, thus emphasizing the role of parental plasticity in shaping their pups’ behavioral and hormonal responses toward humans.” (Schell et al. 2018)

“Our results from both tests indicate that urban coyotes are bolder and more exploratory than rural coyotes and that within both populations there are individuals that vary across both spectrums. Bolder behavior in urban coyotes emerged over several decades and we speculate on possible processes (e.g., learning and selection) and site differences that could be playing a role in this behavioral adaptation. We hypothesize that an important factor is how people treat coyotes; in the rural area coyotes were regularly persecuted whereas in the urban area coyotes were rarely persecuted and sometimes positively rewarded to be in close proximity of people. Negative consequences of this behavioral adaptation are coyotes that become bold enough to occasionally prey on pets or attack humans. (Breck et al. 2019)

Urban coyote behavior

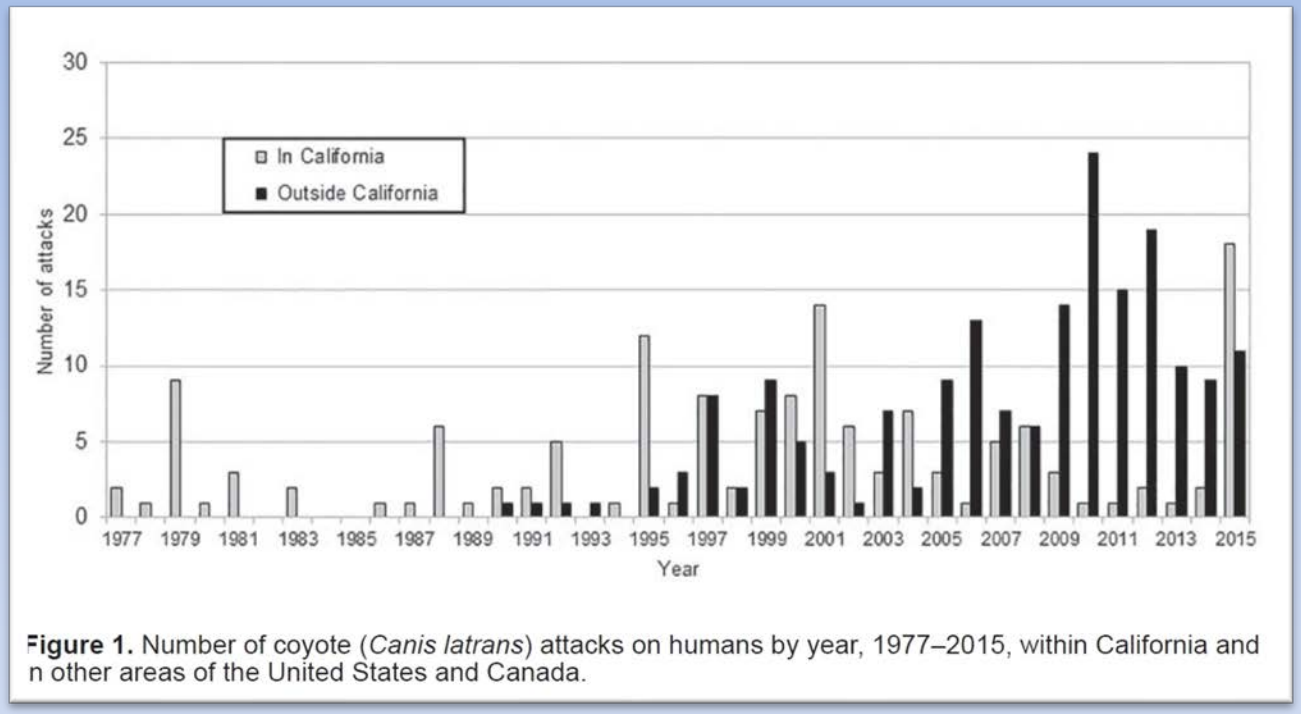

Figure 1. Number of coyote (*Canis latrans*) attacks on humans by year, 1977–2015, within California and n other areas of the United States and Canada.

The graph demonstrates human coyote conflict is disproportionately higher in California when compared to the rest of the country.

The data used to create this chart (Timm & Baker 2017) was gathered by inquiring with representatives of various federal, state, county, and city agencies as well as private wildlife control companies and searching media databases. The number of incidents are likely higher demonstrating a real need for statewide reporting requirements and centralized data collection.

HSUS & Project Coyote Graphic

Problems with the coyote Graphic

The HSUS graphic is “over simplified and unproven” (Gese 2015)

The graphic does not consider coyotes filling roles as residents, transients or switching between the two roles.
(Ward, et al. 2018) observed 147 coyotes, 60 coyotes (40.8%) were residents, 48 (26.5%) were transients for the entire time they were monitored, and 39 (26.5%) coyotes exhibited both residency and transiency.

The graphic does not consider coyotes are only fertile during the breeding season.
Females are seasonally monoestrus, showing one period of “heat” per year, usually during January and March, depending on geographic locale (Hamlett 1939; Gier 1968; Kennelly 1978)
“Male coyotes gradually produce increasing amounts of gonadal testosterone during the presumptive breeding season (November to March) and often reach peak levels in January, then experience testicular regression the remainder of the year (Minter and DeLiberto 2008). During this period of testicular atrophy, testosterone levels are basal, testicular volume is minimal, sperm production is zero.” (Young et al. 2018)

Problems with the coyote Graphic

No evidence that “pack disruption” contributes to increased fecundity. Observational data from a study co authored by Project Coyote science advisor Robert Crabtree contradicts claims exploitation leads to pack disruption and increased breeding opportunities.
In “Foraging Ecology of Coyotes (Canis latrans); the influence of extrinsic factors and a dominance hierarchy,” in all instances where “alpha” coyotes were killed, another coyote from the pack filled the role of “alpha.” (Gese el al. 1996)

Ignores the role of food availability contributes to reproductive success.
“The percentage of females that breed in a given year varies with local conditions. (Gier 1968; Knowlton 1972: Gipson et al. 1975; Gese et al. 1989 a; Knowlton and Gese 1995). Food supply is usually the prime factor; in good years, more females, especially yearlings breed. (Gier 1968: Knowlton and Gese 1995) Usually, about 60-90% of adult females and 0-70% of female yearlings will produce litters.” (Knowlton 1972; Gese et al. 1989a; Knowlton et al. 1999)

“It is known that litter size is effected by population density and food availability from the previous winter.” (Knowlton 1972; Gese et al. 1996a, 1996b; Knowlton et al. 1999)

By intentionally not including information that does not support the objective of “compassionate coexistence,” Project Coyote and the Humane Society are misleading the public and creating confusion by blurring the line between academia and advocacy.

Compensatory reproduction

Theory based on observations of coyote response to exploitation and efforts to reduce coyote populations at a regional or landscape level.

Weak evidence to support compensatory reproduction as a result of exploitation.

Food availability played a dominant role in litter size and pregnancy rates.

Litter size is effected by population density and food availability the previous winter (Knowlton 1972; Gese et al. 1996a, 1996b; Knowlton et al. 1999).

Rebound effect, not a catapult effect

In areas where coyote populations were reduced 44-61% and 51-75%, both pack size and density rebounded to pre-removal levels within 8 months post-removal."

However, "accounting for both changes in prey abundance and coyote density, litter size was significantly related to prey abundance/coyote." (Gese 2005)

Removing individual coyotes for public safety purposes on the basis of behavior focusing on individual animals would not likely rise to the level of initiating a density dependent response.

Research suggests that annual removal of approximately 50–70% of the coyote population is necessary to drive down the population density. (Connolly and Longhurst 1975, Gese 2005)

Removing coyotes based on demonstrated aggressive behavior as part of an overall management plan which includes education and behavior monitoring is reasonable and appropriate to provide for public safety and ensure a healthy coyote population.

Removing individual coyotes based on behavior with the goal to provide for public safety would not likely rise to the level of initiating a density dependent response as claimed by critics of lethal control.

The question to ask is, Where do we draw that line?

Table 1. Sequence of increasingly aggressive coyote behaviors

Increasing Aggression

1. Increase in coyotes on streets and in yards at night
2. Increase in coyotes approaching adults and/or taking pets at night
3. Coyotes on streets, and in parks and yards, in early morning/late afternoon
4. Coyotes chasing or taking pets in daytime
5. Coyotes attacking and taking pets on leash or near owners; chasing joggers, bicyclists, other adults
6. Coyotes seen in and around children's play areas, school grounds, and parks in midday
7. Coyotes acting aggressively toward adults in midday

R. M. Timm, UC Research & Extension Center, Hopland; C. C. Coolahan, USDA-APHIS Wildlife Services, Sacramento, CA.; R. O. Baker, emeritus, CA State Polytechnic Univ.-Pomona; and S. F. Beckerman, USDA-APHIS Wildlife Services, Springfield, IL. https://ucanr.edu/sites/alternativefruits/files/121297.pdf .

Relevant CDFW Policy

§ 1801. Policies and Objectives
It is hereby declared to be the policy of the state to encourage the preservation, conservation, and maintenance of wildlife resources under the jurisdiction and influence of the state. This policy shall include the following objectives:

To maintain sufficient populations of all species of wildlife and the habitat necessary to achieve the objectives stated in subdivisions (b), (c), and (d).

To provide for the beneficial use and enjoyment of wildlife by all citizens of the state.

To perpetuate all species of wildlife for their intrinsic and ecological values, as well as for their direct benefits to all persons.

To provide for aesthetic, educational, and nonappropriative uses of the various wildlife species.

To maintain diversified recreational uses of wildlife, including the sport of hunting, as proper uses of certain designated species of wildlife, subject to regulations consistent with the maintenance of healthy, viable wildlife resources, the public safety, and a quality outdoor experience.

To provide for economic contributions to the citizens of the state, through the recognition that wildlife is a renewable resource of the land by which economic return can accrue to the citizens of the state, individually and collectively, through regulated management. Such management shall be consistent with the maintenance of healthy and thriving wildlife resources and the public ownership status of the wildlife resources.

(g) To alleviate economic losses or public health or safety problems caused by wildlife to the people of the state either individually or collectively. Such resolution shall be in a manner designed to bring the problem within tolerable limits consistent with economic and public health considerations and the objectives stated in subdivisions (a), (b) and (c).

Relevant CDFW Policy

The Mission of the California Department of Fish and Wildlife (CDFW) is to manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public. Pursuant to Fish and Game Code section 703.3, resource management decisions of the CDFW should incorporate adaptive management to the extent possible. It is CDFW's intent to improve the management of biological resources over time by incorporating adaptive management principles and processes, as appropriate, into conservation planning and resource management. This includes:

Designing monitoring and targeted studies that are integral to an adaptive management framework;

Improving our organization's knowledge base by synthesizing new information gathered through monitoring, targeted studies, and credible scientific sources; and

Regularly re-evaluating, based on the best available science, and adjusting if needed, our conservation and management strategies and practices to meet our long-term goals

Relevant CDFW Policy

Assembly Bill 2402 and the Science Institute
In September 2012, Governor Edmund G. Brown Jr. signed Assembly Bill 2402 (Stats. 2012, ch. 559, §§ 1-28) into law, which made a number of changes to Fish and Game Code. Among other provisions, the bill makes statements of policy relating to the use of ecosystem-based management, adaptive management, and credible science; and requires establishment of a Science Institute to assist CDFW and the Fish and Game Commission (Commission) in obtaining independent scientific review, advice, and recommendations to help inform their scientific work. Section 12 of the bill (refer to Fish and G. Code § 715, subd. (b)) states that the objectives of the Science Institute shall include, but not necessarily be limited to, the following:

1. Providing independent scientific guidance of the scientific research, monitoring, and assessment programs that support CDFW's and the Commission's work with fish and wildlife species and their habitats.
2. Providing the best available independent scientific information and advice to guide and inform CDFW and Commission decisions.
3. Promoting and facilitating independent scientific peer review.
4. Promoting science-based adaptive management.
5. Ensuring scientific integrity and transparency in decision-making.

Keep Me Wild

- “Focuses on removing attractants and hazing animals as primary efforts to help prevent human wildlife conflicts” (Stafford Lehr, emailed communication, April 2, 2008 pp 1-4)
- Removing attractants
  - Intentional/unintentional feeding of coyotes often leads to habituation.
  - What level of removal of attractants in urban environments is necessary to encourage coyotes to forage on more natural food sources?
  - No evidence to support removing attractants as an effective tool to manage urban coyote behavior.

Keep Me Wild

No scientific evidence to support the efficacy of hazing.

Hazing policy does not consider age, physical condition, and mental acuity of hazer

Hazing does not consider the impact of disease on coyote behavior. Difficult to impossible to visually detect disease in coyotes (other than acute mange).

“Once coyotes have begun acting boldly or aggressively around humans, it is unlikely that any attempts at hazing can be applied with sufficient consistency or intensity to reverse the coyote habituation. In these circumstances, removal of the offending animals is probably the only effective strategy” (Timm et al. 2004).

“The main problem with most fear-provoking stimuli is that animals soon learn that they pose no real threat and then ignore them. Habituation is the main factor that limits the effectiveness of fear-provoking stimuli as a method to resolve human-wildlife conflicts.” (Conover 2002)

"As successive generations of urban coyotes become more habituated to people, they will exploit that environment and assert their dominance until something (or someone) gives them good reason to be wary of humans." (Oleyar 2010)

Hidden consequences of human–wildlife conflict

Post Traumatic Stress Disorder

In a content analysis of Canadian media (Alexander et al. 2008), “In 14/70 (20%) of urban cases, pet owners describe their response to the killing or coyote-pet interactions as “traumatic”, or to have created symptoms similar to or diagnoses of Post Traumatic Stress Disorder (PTSD).”

Acknowledging the hidden impacts of human–wildlife conflict and minimizing them is important for realizing both wildlife conservation and the wellbeing of people.

Lack of effective urban management may lead to reduced tolerance of urban coyotes.

Although conflict cannot be eliminated, it can be reduced by well-planned and implemented strategies. In order to be effective, these strategies must approach the conflict holistically and address both the animal and the human sides of the problem.

Wildlife Rehabilitation

In a September 5, 2019 article in the Acorn Anna Marie Reams, Wildlife Care director, of Wildlife Care of Southern California said “the Wildlife Care center began treating coyotes sickened from eating contaminated prey in 2017, and since then has cared for 52 coyotes.

“All but five have been treated in the field.”

This means between 2017 and September, 2019, 47 coyotes were treated for mange by directly feeding them “food spiked with medicine to cure its mange.” (Acorn 2019)

This appears to be a direct violation of the standard Wildlife Rehabilitation Memorandum of Understanding requiring permitees to comply with Fish and Game Code. Feeding coyotes food spiked with medicine is likely a violation of FGC Section 251.1 Harassment of Animals: is defined as an intentional act which disrupts defined as an intentional act which disrupts an animal's normal behavior patterns, which includes, but is not limited to, breeding, feeding or sheltering.

Wildlife Rehabilitation

The CDFW's Keep Me Wild page makes it clear: "if coyotes are given access to human food and garbage, their behavior changes. They lose caution and fear. They may begin to harass domestic livestock and pets . They might threaten human safety." (CDFW KMW)

Title 14 CCR § 671 (b)
"Mammals listed to prevent the depletion of wild populations and to provide for animal welfare are termed "welfare animals", and are designated by the letter "W". Those species listed because they pose a threat to native wildlife, the agriculture interests of the state or to public health or safety are termed "detrimental animals" and are designated by the letter "D"

Coyotes are currently termed "welfare animals"

There is no evidence to support coyote populations may be depleted. Feeding coyotes leads to habituation and considering the Department states on its Keep Me Wild page "habituated urban coyotes may be a risk to public safety," the department should consider placing a moratorium on the rehabilitation of urban coyotes until it can be determined rehabilitation does not lead to habituation.

Conclusion

- Management should be based on “best available science” and include “adaptive management.”
  - Department information regarding coyotes is decades old.
- Policies implemented to address human wildlife conflict should be evidence based.
- Education is vital
  - Regional approach
    - Consistent
    - Best available science
    - Evidence based
- Human wildlife conflict is increasing
  - Work to improve reporting across various state, county, local, private agencies
  - both the animal and the human side of conflict should be managed. Human wildlife conflict is not solely a “people problem”
  - The Department should consider the creation of a multi platform software program (phone, tablet, personal computer) to improve participation and data collection

- Removing coyotes based on demonstrated aggressive behavior as part of an overall management plan which includes education and behavior monitoring is reasonable and appropriate to provide for public safety and ensure a healthy coyote population.

Literature Cited

Acorn, Burtholdo, Stephanie. “Helping Hand for Coyote.” The Acorn, Sept. 2019, www.theacorn.com/articles/helping-hand-for-coyote/.

Alexander, Shelley M., and Michael S. Quinn. "Human-coyote (Canis latrans) interaction in Canadian urban parks and green space: Preliminary findings from a media-content analysis." (2008).

Andelt, W.F. 1985. Behavioral ecology of coyotes in south Texas. Wildlife Monographs 94:1-45.

Baker, Rex O., and Robert M. Timm. "Coyote attacks on humans, 1970-2015: implications for reducing the risks." Human–Wildlife Interactions 11.2 (2017): 3.

Bekoff, Marc, and Michael C. Wells. "The social ecology of coyotes." Scientific American 242.4 (1980): 130-151.

Bekoff, Marc, and Michael C. Wells. "Social ecology and behavior of coyotes." Advances in the Study of Behavior. Vol. 16. Academic Press, 1986. 251-338.

Bowen, W. Don. "Home range and spatial organization of coyotes in Jasper National Park, Alberta." The Journal of Wildlife Management (1982): 201-216.

Breck, S.W., Poessel, S., Mahoney, P. et al. The intrepid urban coyote: a comparison of bold and exploratory behavior in coyotes from urban and rural environments. Sci Rep 9, 2104 (2019). https://doi.org/10.1038/s41598-019-38543-5

Connolly and W. M. Longhurst. 1975. The effects of contsol on coyote populations. Univ.Calif., Div. Agric. SCI. Bull. 1872. 37pp.

Conover, M. R. 2002. Resolving Human-Wildlife Conflicts. CRC Press, LLC, Boca Raton, FL. 418 pp.

Fedriani, J.M., T.K. Fuller, and R.M. Sauvajot. 2001. Does availability of anthropogenic food enhance densities of omnivorous mammals? An example with coyotes in southern California. Ecography 24:325-331.

Gese, Eric M., Orrin J. Rongstad, and William R. Mytton. "Home range and habitat use of coyotes in southeastern Colorado." The Journal of Wildlife Management (1988): 640-646.

Literature Cited

Gese, E.M., R.L. Ruff, and R.L. Crabtree.1996a. Social and nutritional factors influencing the dispersal of resident coyotes. Anim. Behav. 52:1025–1043.

Gese, E.M., R.L. Ruff, and R.L. Crabtree. 1996b. Foraging ecology of coyotes
(Canis latrans): the influence of extrinsic factors and a dominance hierarchy. Can. J.Zool. 74:769–783.

Gese, Eric, "Demographic and Spatial Responses of Coyotes to Changes in Food and Exploitation" (2005). Wildlife DamageManagement Conferences -- Proceedings. Paper 131.h?p://digitalcommons.unl.edu/icwdm_wdmconfproc/131

Gier, H. T. "Coyotes in Kansas, rev." Kansas agricultural experiment station, Kansaa State University, Manhattan, Kansas (1968).

Gipson, P. S., and J. A. Sealander. "Home range and activity of the coyote (Canis latrans frustror) in Arkansas." Proceedings of the Annual Conference of the Southeastern Association of Game and Fish. Vol. 26. 1972.

Gipson, Philip S., Ilene K. Gipson, and John A. Sealander. "Reproductive biology of wild Canis (Canidae) in Arkansas." Journal of Mammalogy 56.3 (1975): 605-642.

Hamlett, George Whitfield Delux. The reproductive cycle of the coyote. No. 1488-2016-123769. 1938.

Knowlton, Frederick F. "Preliminary interpretations of coyote population mechanics with some management implications." The Journal of Wildlife Management (1972): 369-382.

Knowlton, Frederick F., and Eric M. Gese. "Coyote population processes revisited." Symposium Proceedings--Coyotes in the Southwest: A Compendium of Our Knowledge (1995). 1995.

Knowlton FF, Gese EM, and Jaeger MM. 1999. Coyote depredation control: an interface between biology and management. J Range Manage 52: 398–412.

Laundré, John W., and Barry L. Keller. "Home-range size of coyotes: a critical review." The Journal of Wildlife Management (1984): 127-139.

Oleyar, Claude M. "How misinformation fosters urban human-coyote conflicts." Proceedings of the Vertebrate Pest Conference. Vol. 24. No. 24. 2010.

Literature Cited

Schell CJ, Young JK, Lonsdorf EV, Santymire RM, Mateo JM. Parental habituation to human disturbance over time reduces fear of humans in coyote offspring. Ecol Evol. 2018;8(24):12965-12980. Published 2018 Dec 11. doi:10.1002/ece3.4741

Timm, R.M., R.O. Baker, J.R. Bennett, and C.C. Coolahan. 2004. Coyote attacks: an increasing suburban problem. Transactions of the North American Wildlife and Natural Resources Conference 69:67-88.

Ward, Jennifer N., et al. "Home range size, vegetation density, and season influences prey use by coyotes (Canis latrans)." PloS one 13.10 (2018): e0203703.

White and Gehrt 2009, Coyote Attacks on Humans in the
United States and Canada. Human Dimensions of Wildlife, 14:419–432, 2009